

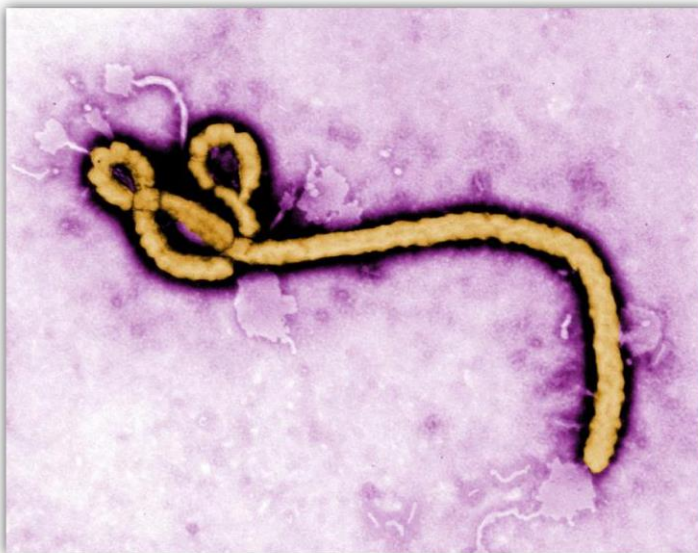
Advisory Committee to the Director

Ebola: Then vs. Now

Anthony S. Fauci, M.D.
Director
National Institute of Allergy and
Infectious Diseases
National Institutes of Health
June 14, 2018



Ebola Virus



Source: CDC

Ebola Virology

■ Family *Filoviridae*, genus *Ebolavirus*

■ Species and average fatality in the genus *Ebolavirus*

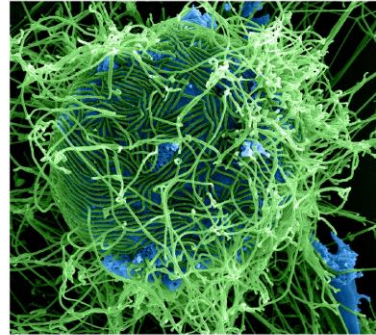
– *Bundibugyo ebolavirus* – ~30%

– *Zaire ebolavirus* – ~40%

– *Reston ebolavirus* – animal disease

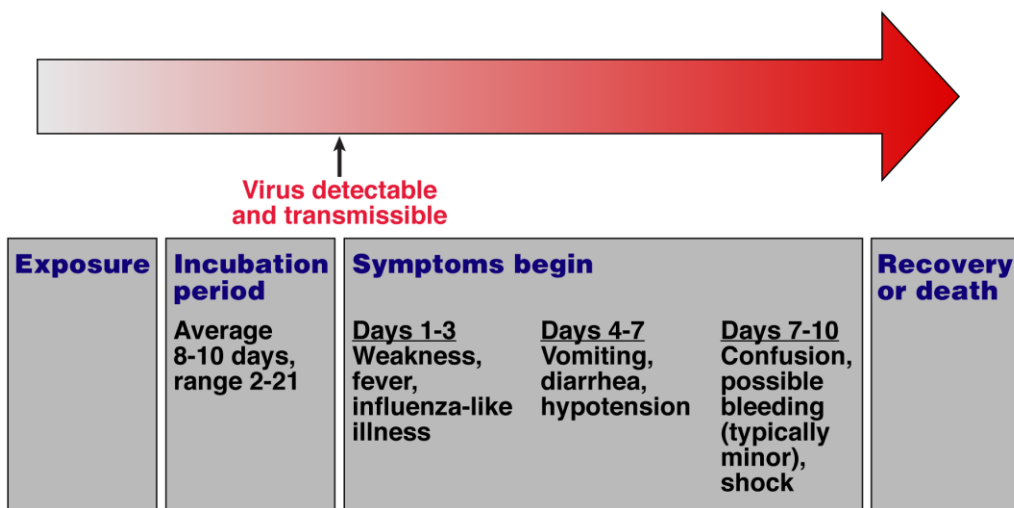
– *Sudan ebolavirus* – ~50%

– *Tai Forest ebolavirus* – 1 non-fatal human case



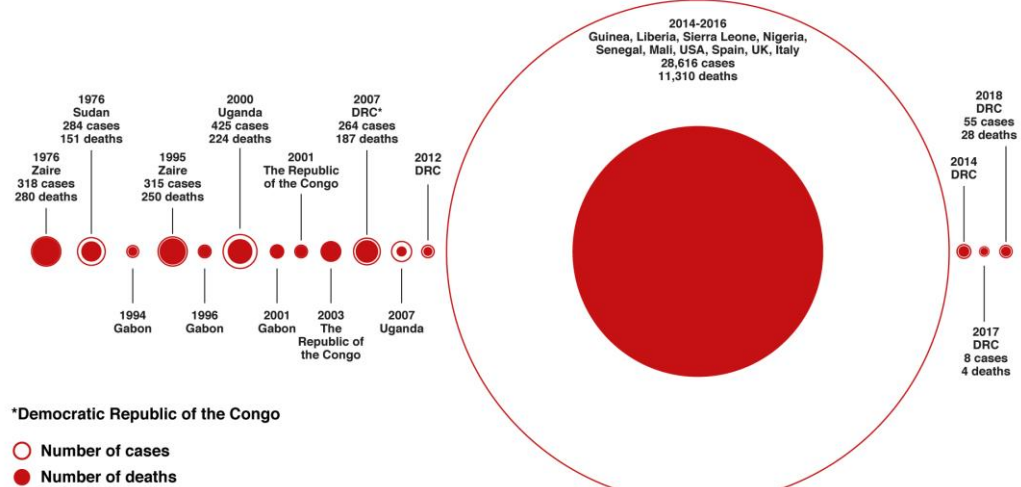
EM of Ebola virus particles (green) attached to Vero cell (blue). NIAID

Typical Ebola Virus Disease Clinical Course



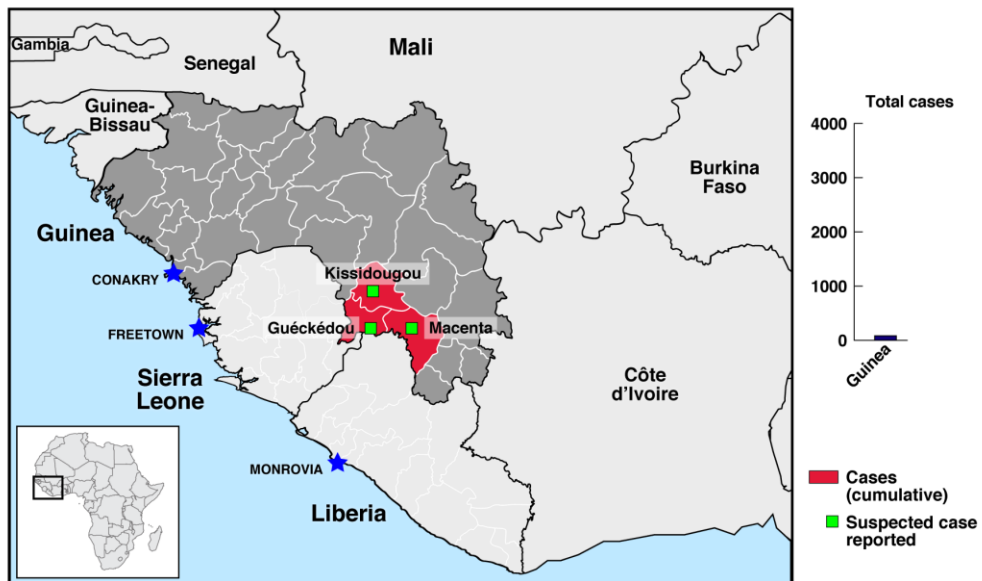
Source: Adapted from N Bhadelia as shown in the *Huffington Post* 8/7/14.

Selected Ebola Outbreaks 1976 to Present Day



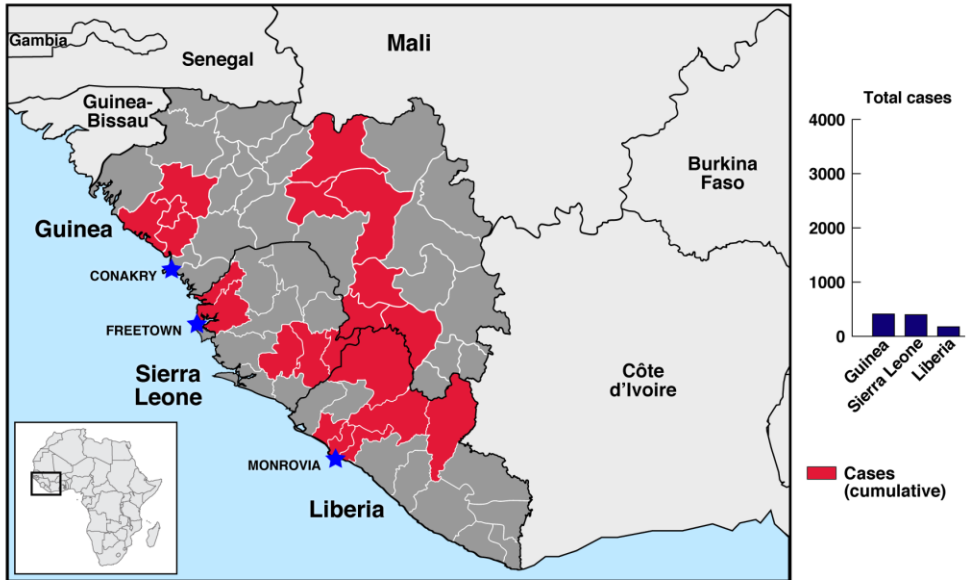
Source: *Nature* Vol 514, June 2018 WHO

State of the Outbreak: March 2014



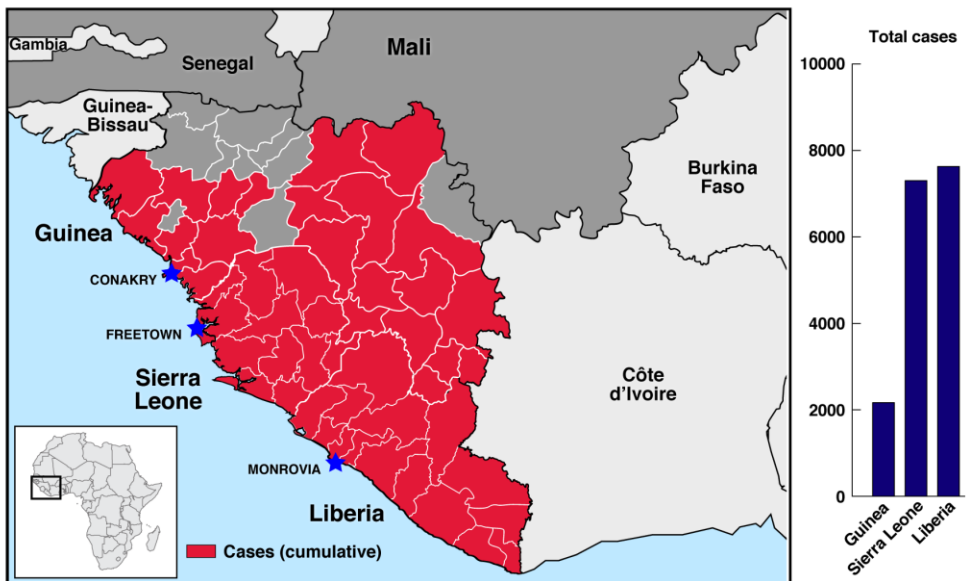
Source: E Ervin, CDC, WHO

State of the Outbreak: July 2014



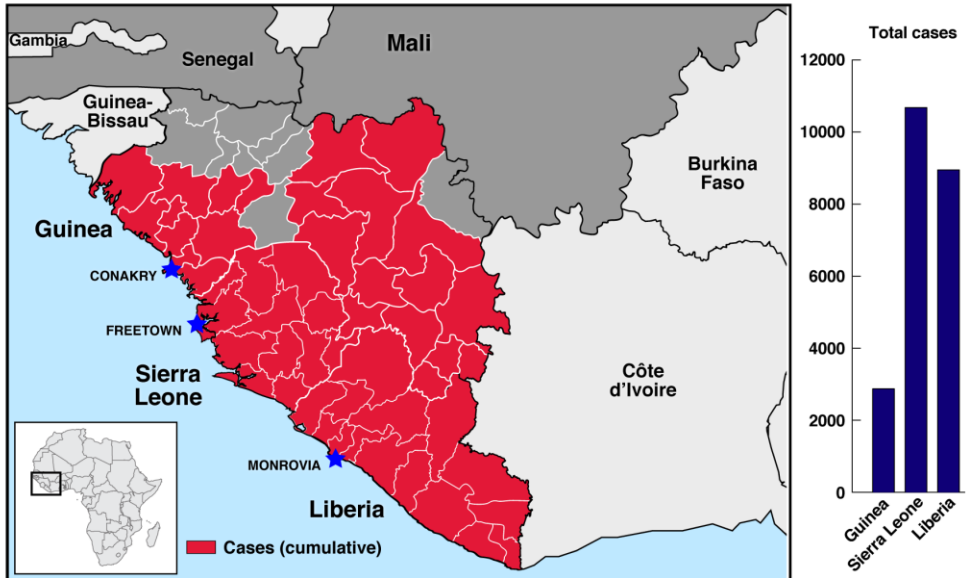
Source: E Ervin, CDC, WHO

State of the Outbreak: Nov. 2014



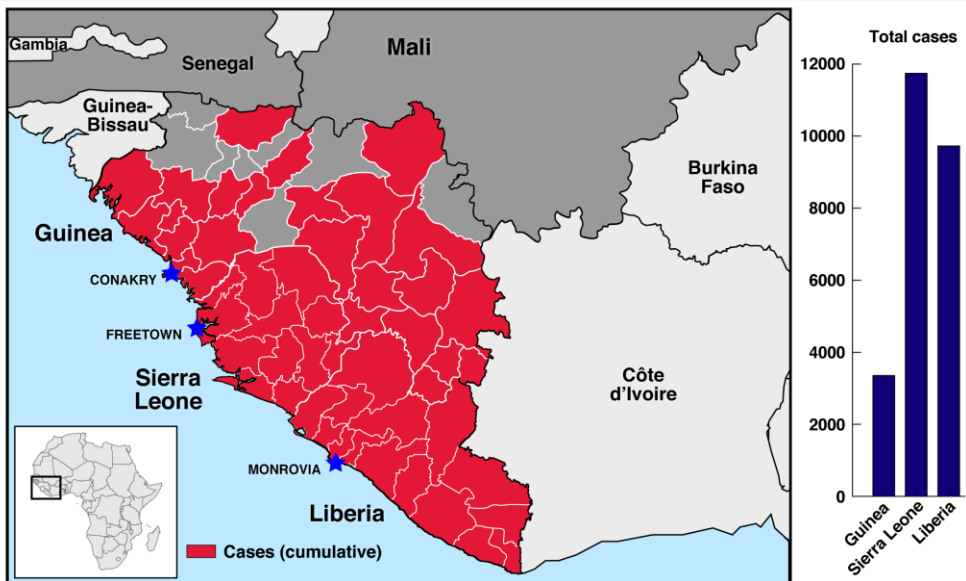
Source: E Ervin, CDC, WHO

State of the Outbreak: Jan. 2015



Source: E Ervin, CDC, WHO

State of the Outbreak: March 2015



Source: E Ervin, CDC, WHO

Viral Hemorrhagic Fever Viruses

- High degree of lethality and high infectivity
- Therapy: Mainly supportive
- Vaccine: Not available at present



Ebola — Underscoring the Global Disparities in Health Care Resources

Anthony S. Fauci, M.D.

“It is unlikely that any miracle cure will end the current epidemic. Rather, sound public health practices, engagement with affected communities, and considerable international assistance and global solidarity will be needed to defeat Ebola in West Africa.”

Public Health Response to Ebola in Affected Countries

- Education
- Hygiene practices
- Case identification
- Contact tracing
- Personal Protective Equipment for caregivers
- Prompt isolation
- Aggressive supportive care
- Safe burials



International Response to Ebola Outbreak: U.S. Response

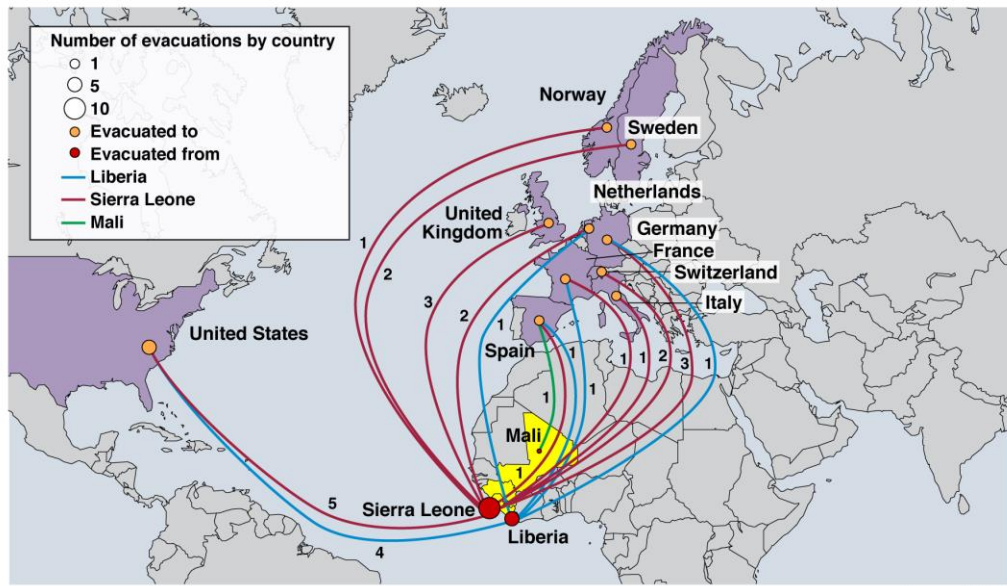


"Faced with this outbreak, the world is looking to us, the United States, and it's a responsibility that we embrace... We are going to keep leading in this effort."

—President Barack Obama, Sept. 16, 2014

- 3,000+ troops
- Construction of Ebola Treatment Units (ETUs)
- 25-bed facility for healthcare workers
- Ongoing CDC and USAID support

Medevacs from West Africa



NIH Special Clinical Studies Unit: Designated Ebola Treatment Facility



*As of Oct. 2014, three Designated Ebola Treatment Facilities existed in the U.S.

The Washington Post

October 25, 2014

Nina Pham, Nurse Who Contracted Ebola, is Now Free of Virus and Leaves NIH



Photo: The Washington Post



Photo: Nina Pham

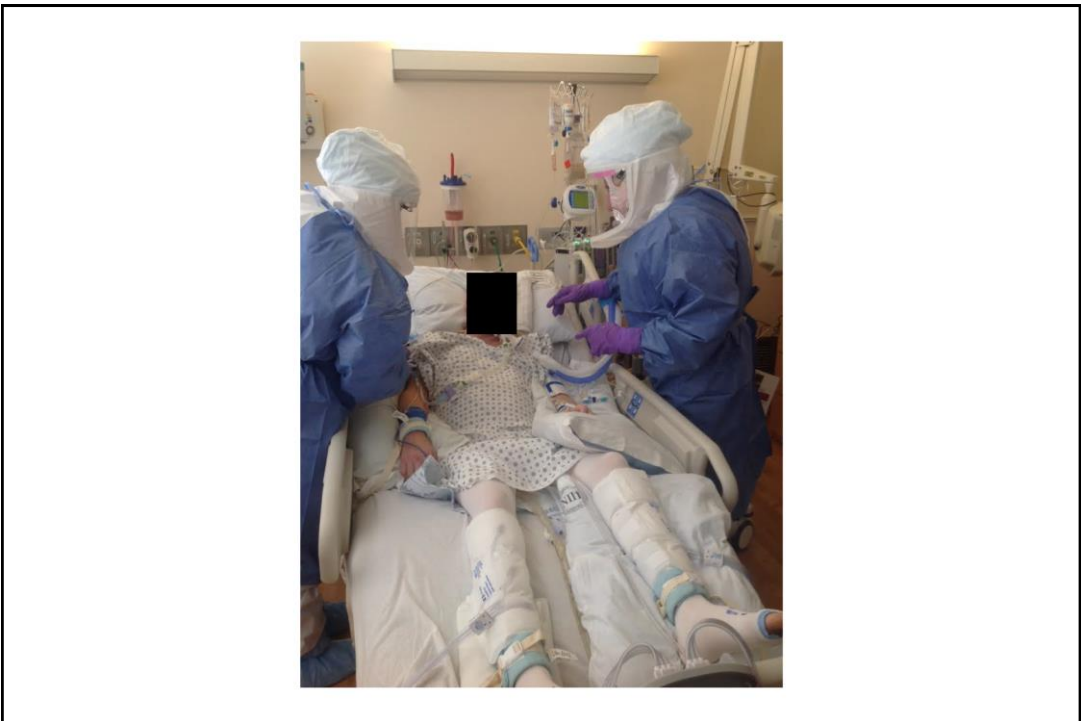


March 12, 2015

U.S. Ebola Patient Headed to NIH









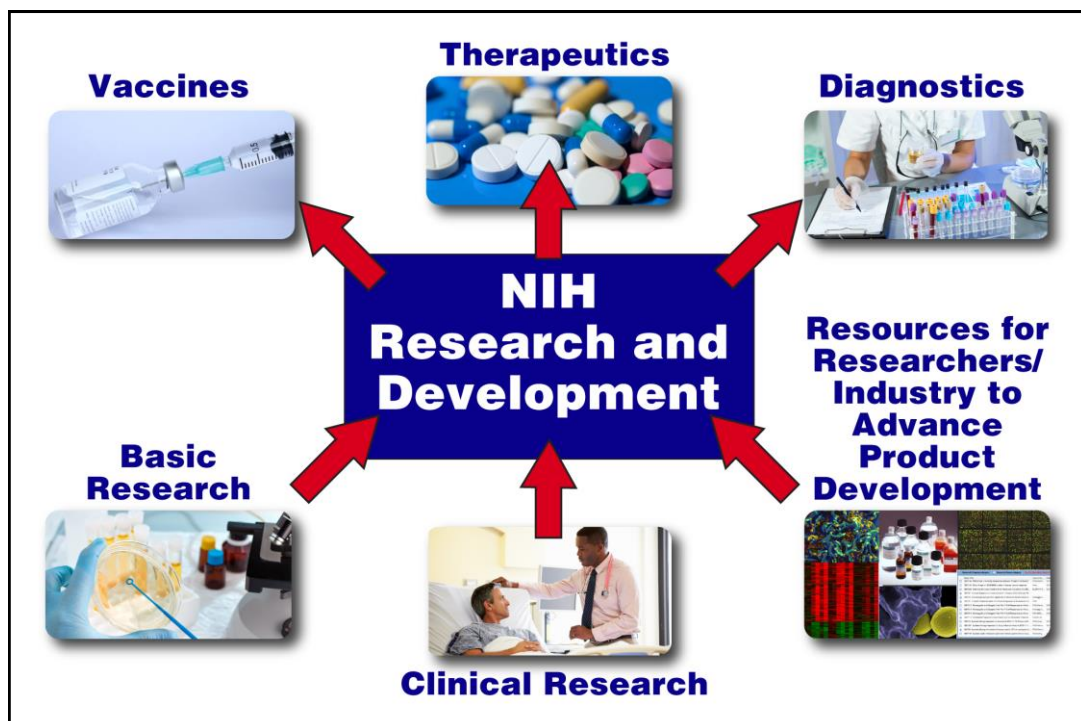
U.S. Department of Health and Human Services

NIH News

National Institutes of Health

Thursday, April 9, 2015

Patient Admitted With Ebola Virus Disease Discharged From NIH Clinical Center





The
**New England
Journal of Medicine**

Established in 1812 as THE NEW ENGLAND JOURNAL OF MEDICINE AND SURGERY

VOLUME 376

January 26, 2017

NUMBER 4

A Recombinant Vesicular Stomatitis Virus Ebola Vaccine – Preliminary Report

JA Regules, JH Beigel, RT Davey Jr, SJ Thomas et al. for the
rVSVAG-ZEBOV-GP Study Group

Feb. 1: Lane Speaks at Opening Ceremony for PREVAIL Ebola Vaccine Study in Monrovia, Liberia



Partnership for Research on Ebola Virus in Liberia (PREVAIL)

Liberia MOH-NIAID Collaboration

- PREVAIL 1: Phase 2, two candidate vaccines vs placebos
- PREVAIL 2: ZMapp vs standard-of-care treatment
- PREVAIL 3: Study of Ebola survivors
- PREVAIL 4: GS-5734 vs placebo for persistent Ebola RNA in semen
- PREVAIL 5 (PREVAC): Phase 2, three vaccine strategies vs placebos
- PREVAIL 6: Genome-wide association study, genetic factors affecting Ebola
- PREVAIL 7: Cataract surgery in Ebola survivors and close contacts



The
New England
Journal of Medicine

Established in 1812 as THE NEW ENGLAND JOURNAL OF MEDICINE AND SURGERY

VOLUME 375

October 13, 2016

NUMBER 15

A Randomized, Controlled Trial of ZMapp for Ebola Virus Infection

The PREVAIL II Writing Group, for the Multi-National PREVAIL II Study Team. RT Davey, Jr., D Malvy et al.

- Multinational RCT of ZMapp + standard of care vs. standard of care alone
- Results showed promise but did not reach statistical significance (in setting of declining in incidence)



The
New England
Journal of Medicine

Established in 1812 as THE NEW ENGLAND JOURNAL OF MEDICINE AND SURGERY

Vol. 377

October 12, 2017

No. 15

Phase 2 Placebo-Controlled Trial of Two Vaccines to Prevent Ebola in Liberia

SB Kennedy, HC Lane et al. for the PREVAIL I Study Group

THE LANCET

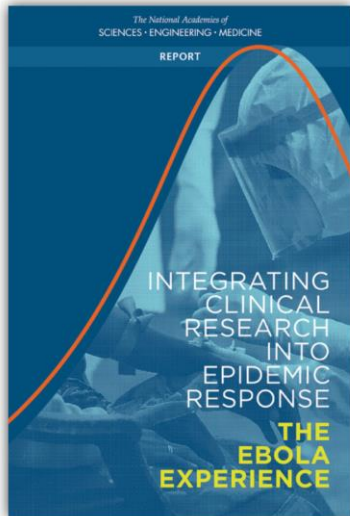
Vol. 389, Issue 10068

February 4-10, 2017

Efficacy and Effectiveness of an rVSV-Vectored Vaccine in Preventing Ebola Virus Disease: Final Results from the Guinea Ring Vaccination, Open-Label, Cluster-Randomised Trial (Ebola Ça Suffit!)

AM Henao-Restrepo, M-P Kieny et al.

April 12: NAS Report on the Ebola Clinical Research Experience



- **Core principles of science and ethics in conducting clinical research should not change during an epidemic**
- **RCTs ethical and appropriate: most efficient, reliable way to determine safety and efficacy**
- **Clinical research studies must have**
 - Scientific and social value
 - Respect for/engagement with affected communities
 - Post-trial access to candidate products proved safe/effective



World Health Organization

May 8, 2018

New Ebola Outbreak Declared in Democratic Republic of the Congo

- **55 cases (38 confirmed), 28 deaths, 634 contacts being followed (as of June 11, 2018)**



Cases reported in three towns in Équateur Province, DR Congo

Ebola Then vs. Now: Key Changes

- Better coordination at the international level
- Significant experience in country
- Strong pre-existing research partnerships
- Countermeasures with evidence from robust clinical trials

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April 20, 2018: Dr. Tedros Visit to NIH and Signing of WHO-NIAID MOU



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Patient with Ebola Hemorrhagic Fever, Bumba Zone, Equateur Province, DR Congo (Zaire), October 1976

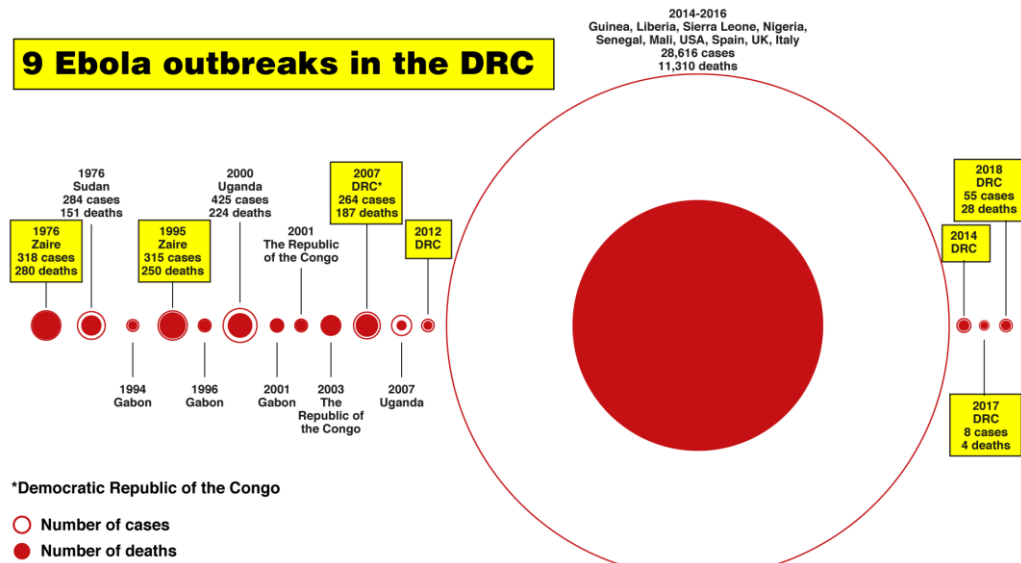
Pierre Sureau
(France) and
patient, 1976



Photo: J. Breman

Ebola Outbreaks 1976 to Present Day

9 Ebola outbreaks in the DRC



Source: *Nature* Vol 514, June 2018 WHO

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THE WALL STREET JOURNAL

May 23, 2018

Experimental Ebola Treatment May Be Deployed to Congo

*Distribution of the therapeutic, developed by the
National Institute of Allergy and Infectious Diseases,
will be coordinated with WHO*

By Betsy McKay

- mAb114 isolated from blood of a survivor of 1995 Ebola outbreak in DR Congo.



Ebola Then vs. Now: Key Changes

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News

Speedy Ebola Tests Help Contain Africa's Latest Outbreak



STAT

May 3, 2018

Experimental Vaccine to be Used against Ebola Outbreak in the DRC

By Helen Branswell

“The plan is to employ a ring vaccination approach, vaccinating anyone who has been in contact with a case.”



REUTERS

June 8, 2018

WHO Chief Says Ebola Outbreak in Congo Is Stabilizing

